may seem desirable, but here again frank discussion of the reasons will remove many of the objections of the patient or the family. In children especially the degree of restoration of the heart integrity by prolonged rest is truly remarkable, and it is often possible to transform what is apparently a seriously handicapped heart invalid into an active, useful individual.

❦

DONALD JACKSON FRICK, M. D. (1136 West Sixth Street, Los Angeles)—It is to be hoped that the newly awakened interest in heart disease will lead to an approximation of the success reached in the handling of tuberculosis as a public health problem. The difficulty, as Doctor Mark has shown lies principally in the fact that in heart disease the etiological factors are multifold while in tuberculosis we have a definite causative organism. Abscessed teeth, as a source of infection, should be included in a discussion of etiology.

It is always difficult to review a problem as extensive as Doctor Mark's without becoming dogmatic. For instance, the statement that all hypertrophied hearts are also dilated is difficult to accept without qualifications.

One cannot help but agree heartily with Doctor Mark that the x-ray is a most valuable adjunct in cardiac study, and must feel that no case is carefully or completely studied until an orthodiagram has been made. It gives much information which cannot otherwise be gained, and in doubtful cases often fixes a diagnosis. It is not only in cardiac area alone but in study of so-called heart tone, in delineation of the heart outline, and investigation of the encroachment upon the posterior mediastinal space and changes in the aorta, that we find the fluoroscopic study of the heart of the greatest assistance. The addition of a new method of study does not of necessity replace the older methods, but should widen our conception of the conditions under investigation.

Our hope for the future undoubtedly lies in prevention of those conditions which result in heart damage. In treatment of persons already presenting heart involvement, we must rely principally on rest and re-education.

❦

AUTHOR (closing)—It is a debatable point whether or not a certain degree of dilatation always accompanies cardiac hypertrophy.

X-ray and fluoroscopic examination of the heart are of inestimable value and should whenever possible supplement the physical examination. I am very pleased to note that this has been emphasized by Doctors Frick and Spiro. Personally I have been very hesitant about making a diagnosis of valvular defects on the basis of fluoroscopic studies. I cannot agree with Doctor Spiro regarding the difficulty of differentiating between the systolic murmur associated with exophthalmic goiter and that due to mitral insufficiency. The systolic murmur accompanying hyperthyroidism usually has its maximum intensity in the pulmonic area and is then easily differentiated from the systolic murmur of mitral insufficiency, which is of maximum intensity at the apex and with definite transmission to the axilla.

As brought out by Doctor Churchill, one experiences greater difficulty in determining the heart borders in the stout man and in women with large breasts. However, by the combined use of palpation, percussion, and auscultatory percussion, and when possible, x-ray, the margin of error is cut to a minimum.

I am very pleased that all the discussers have laid particular emphasis on prolonged rest, which is in absolute accord with my views as brought out in my paper.

THE LURE OF MEDICAL HISTORY*

JOHN HUNTER

With His Own Graphic Account of His Attack of Coronary Occlusion in 1773

On the Second Centenary of His Birth

By FREDERICK LEET REICHERT, M. D.
San Francisco

IN the history of medicine the figure of John Hunter, younger brother of William Hunter, dominates the eighteenth century. He may in reality be acclaimed as the father of scientific surgery, since he initiated those developments in surgery which led in the two centuries just past to the gradual replacement of empiricism by the application of anatomical, physiological and pathological knowledge. His fame lifted him well above the ranks of his profession, and he was regarded by Billroth, that master genius of German surgery, as one of the greatest men the English nation has produced. His birth is recorded in the parish register of Kilbride, near Glasgow, as of February 13, 1728, just two hundred years ago, and he died in London in 1793.

MAJOR ACHIEVEMENTS OF JOHN HUNTER

We pay tribute to John Hunter daily in our recognition of his great contributions to medical science. Among them are his accurate descriptions of the natural history and diseases of the teeth, the exact mode of the descent of the testis, the cause of inflammation in veins, the introduction of the stomach tube as a means of administering food and medicine, the Hunterian operation for the cure of aneurysm, the efficiency of mercury in the treatment of syphilis, the circulation of the placenta studied in collaboration with his brother William, a treatment for ruptured tendons, the mode of growth of bones, the treatment of gunshot wounds, and finally, as the greatest contribution of all, his museum, now in the Royal College of Surgeons, London.

JOHN AND WILLIAM HUNTER

At the age of twenty John Hunter came to the school of his brother William in London as a voluntary helper, and within a year became an assistant in this famous group of anatomists. Here he readily learned the fundamentals of anatomical investigation from his brother, and he soon began independent researches in comparative anatomy. "He saw the meaning of science more clearly than any man who had lived, and he had the genius to make others see that meaning."

This paper is not concerned with the unfortunate controversy that separated these brothers, nor with the younger man's impetuous and petty quarrels. A tribute is due his tireless energy in revealing the truths that awaited him in the animal and vegetable world, not only in anatomy and physiology, but also in the new field of pathology. He was an alert and inspiring teacher, a master mind, reflected in such illustrious pupils as Edward Jenner, Sir Astley Cooper, John Abernethy, William Clift, James Parkinson, Sir William Blizard, Sir Evarard Home, Edward Alanson, Wright Post of New York, and Phillip

* From the Department of Surgery, Stanford University Medical School.

Syng Physick of Philadelphia, the last named the father of surgery in America.

SPECIAL STUDIES BY JOHN HUNTER

His strenuous life of over sixty years contained many interesting events, such as the experimental inoculation of himself with gonorrhea and syphilis to afford an accurate study of the course of the disease and the effects of treatment.

During the study of heat in animals he had hopes at one time of indefinitely prolonging life by means of human hibernation. He speculated thus: "If a man would give up the last ten years of his life to this alternate oblivion and action, I might prolong it for a thousand years by thawing him every hundredth anniversary, when he might learn what had happened during his frozen condition, being thawed to precisely the same condition at which I froze him."

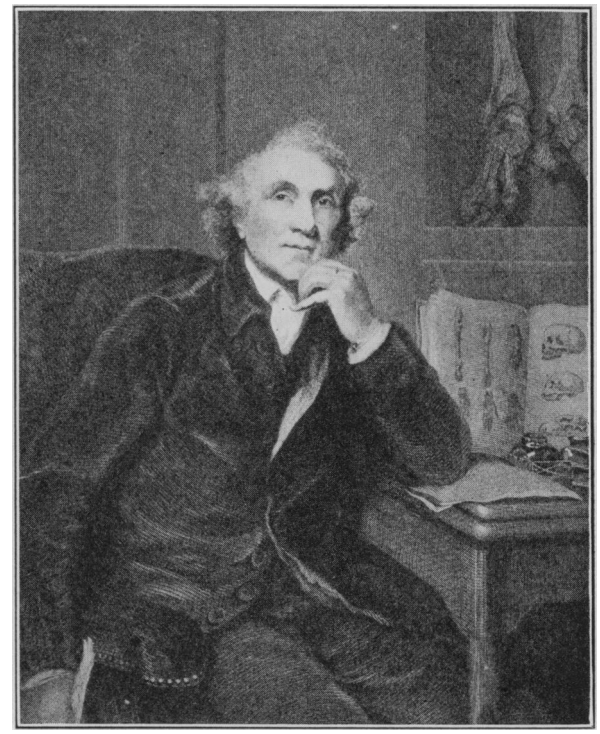
In his successful treatment of aneurysm, he applied the observations which he obtained after ligating the carotid artery of a deer in Richmond Park. In the first few days the antler seemed to wither, but after a week he found it warm and viable. When he dissected the head of the animal he discovered that anastomotic vessels furnished sufficient blood supply to keep the antler alive. Thus by experimentation came the principle that when the main artery to a part is ligated, collateral vessels by anastomosis provide adequate nourishment. Within a few months he applied this theory in the successful cure of a popliteal aneurysm.

In his eagerness to secure the skeleton of the Irish giant, O'Brien, who was seven feet seven inches tall, he was forced to pay five hundred pounds to the undertaker and his hirelings before they would release the body. The lower extremities of this famous skeleton are illustrated in the painting of Hunter by Sir Joshua Reynolds.

JOHN HUNTER'S STUDY OF CORONARY OCCLUSION

Today, because of our more exact knowledge of coronary occlusion, we find of more than passing interest the account of Hunter's illness, which covered the last twenty years of his life. Some of the symptoms he himself recorded, others were dictated to his brother-in-law and associate, Sir Evarard Home. We now recognize that instead of having repeated attacks of angina pectoris, as his pupil Jenner suspected, he suffered from coronary occlusion, as well as angina pectoris and cerebral arteriosclerosis. Heberden, a contemporary of Hunter, in 1768 first used the expression "angina pectoris," although Morgagni in 1743 observed the ossification of the coronary arteries which he correlated with the patient's symptoms.

Hunter's classical and graphic description of an attack of coronary occlusion which assailed him in the spring of 1773 deserves to be quoted in full. Sir Evarard Home records it as follows: "Having met with something which very forcibly affected his mind, he was attacked at 10 o'clock in the forenoon with a pain in the stomach, about the pylorus; it was the sensation peculiar to those parts, and became so violent that he tried change of position to procure ease; he sat down, then walked, laid himself down on the carpet, then



JOHN HUNTER

upon chairs, but could find no relief. He took a spoonful of tincture of rhubarb with thirty drops of laudanum, without the slightest benefit. While he was walking about the room, he cast his eyes on the looking-glass, and observed his countenance to be pale, his lips white, giving the appearance of a dead man; this alarmed him, and led him to feel for his pulse; but he found none in either arm. Several physicians of his acquaintance were then sent for: Dr. William Hunter, Sir George Baker, Dr. Huch Saunders, and Sir William Fordyce. All came, but could find no pulse; the pain still continued, and he found himself at times not breathing. Being afraid of death soon taking place if he did not breathe, he produced the voluntary act of breathing, by working his lungs by the power of the will; the sensitive principle, with all its effects on the machine not being in the least affected by the complaint. In this state he continued for three-quarters of an hour, in which time frequent attempts were made to feel the pulse, but in vain; however, at last, the pain lessened, and the pulse returned, although at first but faintly, and the involuntary breathing began to take place. While in this state, he took Madeira, brandy, ginger, etc., but did not believe them of any service, as the return of health was very gradual; in two hours he was perfectly recovered."

The next illness of importance came about three years later, and appears to have been an "inflammation in the arteries of the brain," accompanied by the feeling of being suspended in the air, and by the sensation that the room was going around. On its subsidence he vomited and felt relieved. These symptoms recurred the following day with the sensations of sight, hearing, smell, and taste extremely acute or heightened. "His pulse was generally about sixty, and weak, and a small degree of heat on the skin, especially on the hands

and feet. He remained in this state about ten days." The ataxia persisted during the convalescent period.

In 1785 an attack of gout ushered in the third serious illness and was followed by "a sensation of the muscles of the nose being in action, attended with an unpleasant sensation in the left side of the face, lower jaw, throat, . . . and down the left arm as low as the ball of the thumb. . . . After these had continued for a fortnight, they extended to the sternum . . . , giving the feel of the sternum being drawn backwards toward the spine, as well as that of oppression in breathing; . . . at these times the heart seemed to miss a stroke; and upon feeling the pulse the artery was very much contracted, often hardly to be felt. . . . He was next seized with a pain in the region of the heart itself; and last of all, with a sensation in the left side, nearly in the seat of the great end of the stomach, attended with considerable eructations of wind from the viscus." Several weeks later the most violent attack came which quite exhausted him and he sank into a swoon or doze to awake with confusion in his head which went off in a few days.

In December, 1789, he suffered a total loss of memory with complete recovery within a half hour. This was followed in two weeks by giddiness and ataxia. "Objects had lost their true direction; a perpendicular, for instance, seemed to lean to the left—and objects were also smaller than the natural recollection of them—and appeared to be at an unusual distance. . . . His recovery from this indisposition was less perfect than from any of the others; he never lost entirely the oblique vision; his memory was, in some respects, evidently impaired, and the spasms became more constant; he never went to bed without their being brought on by the act of undressing himself . . . .The least exertion in conversation after dinner was attended by them."

An attack in October, 1792, was so violent that Home thought he would not live. The final attack which caused his instant death occurred at St. George's Hospital on October 16, 1793, when Hunter, angered at a meeting, restrained his feeling and left the room to drop over dead.

AUTOPSY FINDINGS

The postmortem was made by Evarard Home, who states that the gastro-intestinal tract was normal and that the gall bladder contained five or six yellow stones. The right lung was clear, but there were strong adhesions to the pleura of the left lung. The pericardium was unusually thickened, but no abnormal fluid was present.

"The heart itself was very small, appearing too little for the cavity in which it lay, and did not give the idea of its being the effect of an unusual degree of contraction, but more of its having shrunk in its size. Upon the under surface of the left auricle and ventricle, there were two spaces, nearly an inch and a half square, which were of a white color, with an opaque appearance, and entirely distinct from the general surface of the heart; these two spaces were covered by an exudation of coagulating lymph, which at some former period had been the result of inflammation there. The muscular structure of the heart was paler and looser in its texture than the other muscles of the body. . . . The coronary arteries had their branches which ramify through the substance of the heart in the state of bony tubes, which were with difficulty divided by the knife, and their transverse sections did not collapse, but remained open. The valvulae mitrals, where they come off from the lower edge of the auricle, were in many places ossified. . . . The semilunar valves of the aorta had lost their natural pliancy, the previous stage to becoming bone. . . .

"The aorta, immediately beyond the semilunar valves, had its cavity larger than usual, putting on the appearance of an incipient aneurysm; this unusual dilatation extended for some way along the ascending aorta, but did not reach so far as the common trunk of the axillary and carotid artery. The increase of capacity of the artery might be about one-third of its natural area; and the internal membrane of this part had lost entirely the natural polish, and was studded over with opaque white spots, raised higher than the general surface. . . .

"The internal structure of the brain was very carefully examined, and the different parts both of the cerebrum and cerebellum were found in the most natural and healthy state; but the internal carotid arteries, as they pass by the sides of the sella tursica, were ossified, and several of the ramifications which go off from them had become opaque and unhealthy in their appearance. The vertebral arteries lying upon the medulla oblongata had also become bony, and the basillary artery, which is formed by them, had opaque white spots very generally along its coats."

ADAMS' DEDUCTIONS

Joseph Adams, in his memoirs of John Hunter, published in 1817, was apparently the first to compare the morbid appearances in the various organs with the symptoms during life. He rightly felt that the opaque spots on the heart probably resulted from the severe illness of 1773, believing "that the heart refused to act, the invariably immediate consequence of high inflammation in a muscle," which today we would interpret as due to coronary occlusion.

The symptoms of 1776 Adams states are readily explained by the appearance within the cavity of the cranium where "the arteries of the brain suffered high inflammation."

During the severe paroxysms of 1785 he felt that "probably calculous deposition took place in the aorta. . . ."

"The symptoms of 1789 were probably the effect of a slighter degree of inflammation about the substance of the brain, or of some irregularity in its supply of blood from the condition of the arteries. . . ."

We must remember that Adams' deductions were made many decades before the functions of the brain had been localized.

John Hunter's remains were interred in the parish church of St. Martins in the Fields and some fifty years later were removed to Westminster Abbey.

"Hunter was a profound philosopher, a great naturalist, a pre-eminent collector, and a foremost surgeon of his time. It was to make surgery more perfect that all his works subserve, and in it to reach the highest rank. He rendered to this art of science greater service than had been done before him, and his fame came to us not merely on what he did, but on what he suggested might be done." (Sir William McCormac, Hunterian Oration, 1899.)

Stanford University School of Medicine.